Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for controlling admission of a new connection onto a transport link in a communication network, said method comprising the steps of:

checking whether a multi-service-class traffic mix defined by previously admitted connections present on said link together with said new connection is contained within an overload-limited admissible region defined as a non-linear admissible region that contains a set of traffic mixes that ~~fulfil~~ fulfill a given overload requirement, where the dimensions of said non-linear admissible region are the number of connections in the respective service classes;

checking, for each of a number of said service classes, whether said traffic mix is contained also within a class-specific delay-limited admissible region approximated as a linear admissible region that contains a set of traffic mixes that fulfil a given class-specific delay requirement, where the dimensions of said linear admissible region are the number of connections in the respective service classes; and

admitting said new connection for transport over said transport link only if said traffic mix is contained within an intersection of said non-linear overload-limited admissible region and said linear delay-limited admissible region(s).

2. (Previously Presented) The method according to claim 1, wherein said delay-limited region is approximated as a linear region for a multi-service-class traffic mix generally modeled as a superposition of periodic on-off connections.

3. (Previously Presented) The method according to claim 1, wherein said overload-limited admissible region contains the set of traffic mixes for which the probability of temporarily overloading a queuing system associated with the transport link is smaller than a given target value.

4. (Previously Presented) The method according to claim 1, wherein said step of checking whether said traffic mix is contained within said non-linear overload-limited admissible region is representative of checking whether or not said traffic mix violates a delay requirement related to packet loss caused by temporary overload of said transport link.

5. (Previously Presented) The method according to claim 1, wherein said step of checking whether said traffic mix is contained within said non-linear overload-limited admissible region comprises the step of evaluating the following inequalities:

$$\sum_{i=1}^{K} A_i \rho_i \leq C,$$

where K is the number of service classes in said traffic mix, A_i is a per-class limit on the number of simultaneously active connections, ρ_i is the average load generated by one active traffic source from class-i and C is the capacity of said transport link.

6. (Previously Presented) The method according to claim 5, wherein the per-class limit A_i is the number of connections from class-i such that the probability that more than A_i connections from class-i are active at the same time is smaller than a given target value.

7. (Previously Presented) The method according to claim 6, further comprising the steps of:

pre-calculating at least some of said A_i values for a range of different values of the number N_i of connections from class-i or for a range of different activity factors α_i;

storing said pre-calculated A_i values in memory; and

accessing said pre-calculated A_i values from said memory for on-line evaluation of said inequalities.

8. (Previously Presented)The method according to claim 6, further comprising the step of determining A_i values by class-wise overload probability evaluation.

9. (Previously Presented)The method according to claim 8, wherein said step of determining A_i values comprises the step of finding values of A_i such that the following sets of inequalities:

$$\sqrt[K_a]{1-\tilde{\varepsilon}_i^{lost}} \geq \frac{\sum_{n_i=0}^{A_i} n_i \prod_i(n_i)}{N_i \alpha_i},$$

$$\sqrt[K_a]{1-\tilde{\varepsilon}_i^{lost}} \geq \sum_{n_l=0}^{A_l} \prod_l(n_l) \qquad l=1,2,\ldots,K_a, l \neq i,$$

are fulfilled, where K_a is the number of classes with activity factor α_i<1, $\tilde{\varepsilon}_i^{lost}$ is the target packet loss probability for service class-i approximated by the target overload probability assigned to class-i, N_i is the number of connections from class-i and n_i is the number of actually active connections from class-i.

10. (Previously Presented) The method according to claim 1, wherein said class-specific packet delay requirement requires that the probability of the class-specific packet delay being larger than a given class-specific maximum delay is smaller than a given target value.

11. (Previously Presented) The method according to claim 1, comprising the step of checking whether said traffic mix is contained within multiple class-specific, delay-limited admissible regions by evaluating the following inequalities:

$$\sum_{i=1}^{K} N_i \cdot TE_{ij} \leq TN_{jj} + \text{constant}, \quad j = 1, 2, \ldots, K,$$

where K is the number of service classes in said traffic mix, TN_{ij} is a representation of the maximum number of connections from class-i assuming that a packet from class-j would fulfil a packet delay requirement of class-j, TE_{ij} is a service class equivalent measure representing how many new connections can be admitted from class-j in place of a connection from class-i considering only the packet delay requirement of class-j and N_i is the number of connections from class-i in the traffic mix.

12. (Previously Presented) The method according to claim 11, wherein TE_{ij} is calculated in the following way:

$$TE_{ij} = TN_{jj}/\ TN_{ij}, \text{ and}$$

TN_{ij} is calculated in the following way:

$$TN_{ij} = \max\left\{ N_i \,\middle|\, \sum_{n_i=0}^{N_i} \Pi(n_i)\ \Pr(D_j^{(i)} > \widetilde{D}_j | n_i \text{ connections are active}) \le \widetilde{\varepsilon}_j^{delayed} \right\},$$

where $D_j^{(i)}$ denotes the delay of a packet from class-j assuming that the delay of the associated queue comes from only class-i connections, $\widetilde{D}_j$ is the target delay criteria of packets from class-j, $\Pr(D_j^{(i)} > \widetilde{D}_j | n_i \text{ connections are active})$ is the probability of packet delay criteria violation, $\widetilde{\varepsilon}_j^{delayed}$ is the target value for the probability of a packet exceeding its delay criteria without getting lost and n_i is the number of actually active connections from class-i.

13. (Previously Presented) The method according to claim 12, wherein the probability of packet delay criteria violation $\Pr(D_j^{(i)} > \tilde{D}_j | n_i \text{ connections are active})$ is calculated in the following way:

$$\Pr(D_j^{(i)} > \tilde{D}_j | n_i \text{ connections are active}) =$$

$$= \sum_{x' < l \le n_i} \binom{n_i}{l} \left(\frac{l - x'}{TTI'} \right)^l \left(1 - \frac{l - x'}{TTI'} \right)^{n_i - l} \cdot \frac{TTI' - n_i + x'}{TTI' - l + x'}$$

$$x' = (\tilde{D}_j - \frac{b_j}{C}) / TU$$

$$TTI' = TTI_i / TU$$

$$TU = \frac{b_i}{C},$$

where b_j is the class-j packet size, C is the capacity of said transport link and TTI_i is the relevant packet inter-arrival time.

14. (Previously Presented) The method according to claim 12, wherein the probability of packet delay criteria violation $\Pr(D_j^{(i)} > \tilde{D}_j | n_i \text{ connections are active})$ is calculated in the following way:

$$\Pr(D_j^{(i)} > \tilde{D}_j \,|\, n_i \text{ connections are active}) = \exp\left\{ - \frac{2Cx}{TTI_i \, n_i \, \rho_i^2} \left(\frac{Cx}{TTI_i} + C - n_i \, \rho_i \right) \right\}$$

$$x = \tilde{D}_j - \frac{b_j}{C},$$

where C is the capacity of said transport link, TTI_i is the relevant packet inter-arrival time, b_j is the class-j packet size and ρ_i is the average load generated by one active traffic source from class-i.

15. (Previously Presented) The method according to claim 11, wherein TE_{ij} is defined as $TE_{ij} = TN_{jj}/ TN_{ij}$, and TN_{ij} is calculated in the following way:

$$TN_{ij} = \left\lfloor \frac{C + \frac{C x \alpha_i}{TTI_i}}{\alpha_i \rho_i - \frac{\alpha_i \rho_i^2 \, TTI_i \ln(\tilde{\varepsilon}_j^{delayed})}{2x}} \right\rfloor$$

$$x = \tilde{D}_j - \frac{b_j}{C},$$

where C is the capacity of said transport link, α_i is the activity factor of class-i, TTI_i is the relevant packet inter-arrival time, ρ_i is the average load generated by one active traffic source from class-i, b_j is the class-j packet size and $\tilde{\varepsilon}_j^{delayed}$ is the target value for the probability of a packet exceeding its delay criteria without getting lost.

16. (Previously Presented) The method according to claim 11, further comprising the step of updating TN_{ij} and TE_{ij}, before said step of checking whether said traffic mix is contained within said intersection of admissible regions, only when said new connection belongs to a new service class.

17. (Previously Presented) The method according to claim 11, further comprising the step of assigning TN_{ij} a real value by means of interpolation.

18. (Previously Presented) The method according to claim 12, wherein, if class-i packets have higher priority than class-j packets, the probability of packet delay criteria violation is calculated in the following way:

$$\Pr\left(B^{(i)}(0, \tilde{D}_j - \frac{s_{last}}{C}) < \frac{b_j - s_{last}}{C} \right),$$

where $B^{(i)}(0, t)$ denotes the server availability in $[0, t]$ seen by the class-j packet arriving at time 0, s_{last} denotes the size of the last segment of the class-j packet, and b_j is the class-j packet size.

19. (Previously Presented) The method according to claim 1, wherein said communication network is a transport network based on the Universal Terrestrial Radio Access Network (UTRAN).

20. (Previously Presented) A method for controlling admission of a new connection onto a transport link in a communication network, said method comprising the steps of:

checking whether a multi-service traffic mix defined by previously admitted connections present on said link together with said new connection is contained within a non-linear overload-limited admissible region by evaluating the following inequalities:

$$\sum_{i=1}^{K} A_i \rho_i \leq C,$$

where K is the number of service classes in said traffic mix, A_i is a per-class limit on the number of simultaneously active connections, ρ_i is the average load generated by one active traffic source from class-i and C is the capacity of said transport link; and

admitting said new connection for transport over said transport link only if said traffic mix is contained within said non-linear overload-limited admissible region.

21. (Previously Presented) A method for controlling admission of a new connection onto a transport link in a communication network, said method comprising the steps of:

checking whether a multi-service traffic mix defined by previously admitted connections present on said link together with said new connection is contained within an intersection of multiple service-class-specific delay-limited admissible regions by evaluating the following inequalities:

$$\sum_{i=1}^{K} N_i \cdot TE_{ij} \leq TN_{jj} + \text{constant}, \quad j = 1, 2, \ldots, K,$$

where K is the number of service classes in said traffic mix, TN_{ij} is a representation of the maximum number of connections from class-i assuming that a packet from class-j would fulfil a packet delay requirement of class-j, TE_{ij} is a service class equivalent measure representing how many new connections can be admitted from class-j in place of a connection from class-i considering only the packet delay requirement of class-j and N_i is the number of connections from class-i in the traffic mix; and

admitting said new connection for transport over said transport link only if said traffic mix is contained within said intersection of admissible regions.

22. (Currently Amended) An admission controller for controlling admission of a new connection onto a transport link in a communication network, said admission controller comprising:

means for checking whether a multi-service-class traffic mix defined by previously admitted connections present on said link together with said new connection is contained within an overload-limited admissible region defined as a non-linear admissible region that contains a set of traffic mixes that ~~fulfil~~ fulfill a given overload

requirement, where the dimensions of said non-linear admissible region are the number of connections in the respective service classes;

means for checking, for each of a number of said service classes, whether said traffic mix is contained also within a class-specific delay-limited admissible region approximated as a linear admissible region that contains a set of traffic mixes that fulfil a given class-specific delay requirement, where the dimensions of said linear admissible region are the number of connections in the respective service classes; and

means for admitting said new connection for transport over said transport link only if said traffic mix is contained within an intersection of said non-linear overload-limited admissible region and said linear delay-limited admissible region(s).

23. (Previously Presented) The admission controller according to claim 22, wherein said delay-limited region is approximated as a linear region for a multi-service-class traffic mix generally modeled as a superposition of periodic on-off connections.

24. (Previously Presented) The admission controller according to claim 22, wherein said overload-limited admissible region contains the set of traffic mixes for which the probability of temporarily overloading a queuing system associated with the transport link is smaller than a given target value.

25. (Previously Presented) The admission controller according to claim 22, wherein said means for checking whether said traffic mix is contained within said non-linear overload-limited admissible region is operable for checking whether said traffic mix violates a packet delay requirement related to packet loss caused by temporary overload of said transport link.

26. (Previously Presented) The admission controller according to claim 22, wherein said means for checking whether said traffic mix is contained within said non-linear overload-limited admissible region comprises means for evaluating the following inequalities:

$$\sum_{i=1}^{K} A_i \rho_i \leq C,$$

where K is the number of service classes in said traffic mix, A_i is a per-class limit on the number of simultaneously active connections, ρ_i is the average load generated by one active traffic source from class-i and C is the capacity of said transport link.

27. (Previously Presented) The admission controller according to claim 26, wherein the per-class limit A_i is the number of connections from class-i such that the probability that more than A_i connections from class-i are active at the same time is smaller than a given target value.

28. (Previously Presented) The admission controller according to claim 27, further comprising:

means for pre-calculating at least some of said A_i values for a range of different values of the number N_i of connections from class-i or for a range of different activity factors α_i;

means for storing said pre-calculated A_i values in memory; and

means for accessing said pre-calculated A_i values from said memory for on-line evaluation of said inequalities.

29. (Previously Presented) The admission controller according to claim 27, further comprising means for determining A_i values by class-wise overload probability evaluation.

30. (Previously Presented) The admission controller according to claim 29, wherein said means for determining A_i values comprises means for finding values of A_i such that the following sets of inequalities:

$$\sqrt[K_a]{1-\tilde{\varepsilon}_i^{lost}} \geq \frac{\sum_{n_i=0}^{A_i} n_i \prod_i(n_i)}{N_i \alpha_i},$$

$$\sqrt[K_a]{1-\tilde{\varepsilon}_i^{lost}} \geq \sum_{n_l=0}^{A_l} \prod_l(n_l) \qquad l = 1,2,\ldots,K_a, l \neq i,$$

are fulfilled, where K_a is the number of service classes with activity factor α_i<1, $\tilde{\varepsilon}_i^{lost}$ is the target packet loss probability for service class-i approximated by the target overload probability assigned to class-i, N_i is the number of connections from class-i and n_i is the number of actually active connections from class-i.

31. (Previously Presented) The admission controller according to claim 22, wherein said class-specific packet delay requirement requires that the probability of the class-specific packet delay being larger than a given class-specific maximum delay is smaller than a given target value.

32. (Previously Presented) The admission controller according to claim 22, comprising means for checking whether said traffic mix is contained within multiple class-specific, delay-limited admissible regions based on evaluation of the following inequalities:

$$\sum_{i=1}^{K} N_i \cdot TE_{ij} \leq TN_{jj} + \text{constant}, \quad j = 1, 2, \ldots, K,$$

where K is the number of service classes in said traffic mix, TN_{ij} is a representation of the maximum number of connections from class-i assuming that a packet from class-j would fulfil a packet delay requirement of class-j, TE_{ij} is a service class equivalent measure representing how many new connections can be admitted from class-j in place

of a connection from class-i considering only the packet delay requirement of class-j and N_i is the number of connections from class-i in the traffic mix.

33. (Previously Presented) The admission controller according to claim 32, wherein said means for checking whether said traffic mix is contained within multiple class-specific, delay-limited admissible regions comprises:

means for calculating TE_{ij} in the following way:

$$TE_{ij} = TN_{jj} / TN_{ij}; \text{ and}$$

means for calculating TN_{ij} in the following way:

$$TN_{ij} = \max\left\{ N_i \,\middle|\, \sum_{n_i=0}^{N_i} \Pi(n_i)\ \Pr\left(D_j^{(i)} > \widetilde{D}_j \middle| n_i \text{ connections are active}\right) \le \widetilde{\varepsilon}_j^{delayed} \right\},$$

where $D_j^{(i)}$ denotes the delay of a packet from class-j assuming that the delay of the associated queue comes from only class-i connections, $\widetilde{D}_j$ is the target delay criteria of packets from class-j, $\Pr(D_j^{(i)} > \widetilde{D}_j | n_i \text{ connections are active})$ is the probability of packet delay criteria violation, $\widetilde{\varepsilon}_j^{delayed}$ is the target value for the probability of a packet exceeding its delay criteria without getting lost and n_i is the number of actually active connections from class-i.

34. (Previously Presented) The admission controller according to claim 33, wherein said means for calculating TN_{ij} comprises means for calculating the probability of packet delay criteria violation $\Pr(D_j^{(i)} > \widetilde{D}_j | n_i \text{ connections are active})$ in the following way:

$$\Pr(D_j^{(i)} > \tilde{D}_j | n_i \text{ connections are active}) =$$

$$= \sum_{x' < l \le n_i} \binom{n_i}{l} \left(\frac{l - x'}{TTI'} \right)^l \left(1 - \frac{l - x'}{TTI'} \right)^{n_i - l} \cdot \frac{TTI' - n_i + x'}{TTI' - l + x'}$$

$$x' = (\tilde{D}_j - \frac{b_j}{C}) / TU$$

$$TTI' = TTI_i / TU$$

$$TU = \frac{b_i}{C},$$

where b_j is the class-j packet size, C is the capacity of said transport link and TTI_i is the relevant packet inter-arrival time.

35. (Previously Presented) The admission controller according to claim 33, wherein said means for calculating TN_{ij} comprises means for calculating the probability of packet delay criteria violation $\Pr(D_j^{(i)} > \tilde{D}_j | n_i \text{ connections are active})$ in the following way:

$$\Pr(D_j^{(i)} > \tilde{D}_j \,|\, n_i \text{ connections are active}) = \exp\left\{ - \frac{2Cx}{TTI_i\, n_i\, \rho_i^2} \left(\frac{Cx}{TTI_i} + C - n_i\, \rho_i \right) \right\}$$

$$x = \tilde{D}_j - \frac{b_j}{C},$$

where C is the capacity of said transport link, TTI_i is the relevant packet inter-arrival time, b_j is the class-j packet size and ρ_i is the average load generated by one active traffic source from class-i.

36. (Previously Presented) The admission controller according to claim 32, wherein said means for checking whether said traffic mix is contained also within multiple class-specific, delay-limited admissible regions comprises:

means for calculating TE_{ij} in the following way:

$$TE_{ij} = TN_{jj} / TN_{ij}; \text{ and}$$

means for calculating TN_{ij} in the following way:

$$TN_{ij} = \left\lfloor \frac{C + \frac{C x \alpha_i}{TTI_i}}{\alpha_i \rho_i - \frac{\alpha_i \rho_i^2 \, TTI_i \ln(\tilde{\varepsilon}_j^{delayed})}{2x}} \right\rfloor$$

$$x = \widetilde{D}_j - \frac{b_j}{C},$$

where C is the capacity of said transport link, α_i is the activity factor of class-i, TTI_i is the relevant packet inter-arrival time, ρ_i is the average load generated by one active traffic source from class-i, b_j is the class-j packet size and $\tilde{\varepsilon}_j^{delayed}$ is the target value for the probability of a packet exceeding its delay criteria without getting lost.

37. (Previously Presented) The admission controller according to claim 32, further comprising means for updating TN_{ij} and TE_{ij}, before checking whether said traffic mix is contained within said intersection of admissible regions, when said new connection belongs to a new service class.

38. (Previously Presented) The admission controller according to claim 32, further comprising means for assigning TN_{ij} a real value by means of interpolation.

39. (Previously Presented) The admission controller according to claim 33, wherein, if class-i packets have higher priority than class-j packets, the probability of packet delay criteria violation is calculated in the following way:

$$\Pr\left(B^{(i)}(0, \tilde{D}_j - \frac{s_{last}}{C}) < \frac{b_j - s_{last}}{C} \right),$$

where $B^{(i)}(0, t)$ denotes the server availability in $[0, t]$ seen by the class-j packet arriving at time 0, s_{last} denotes the size of the last segment of the class-j packet, and b_j is the class-j packet size.

40. (Previously Presented) The admission controller according to claim 22, wherein said communication network is a transport network based on the Universal Terrestrial Radio Access Network (UTRAN).

41. (Previously Presented) An admission controller for controlling admission of a new connection onto a transport link in a communication network, said admission controller comprising:

means for checking whether a multi-service traffic mix defined by previously admitted connections present on said link together with said new connection is contained within a non-linear overload-limited admissible region based on evaluation of the following inequalities:

$$\sum_{i=1}^{K} A_i \rho_i \le C,$$

where K is the number of service classes in said traffic mix, A_i is a per-class limit on the number of simultaneously active connections, ρ_i is the average load generated by one active traffic source from class-i and C is the capacity of said transport link; and

means for admitting said new connection for transport over said transport link only if said traffic mix is contained within said non-linear overload-limited admissible region.

42. (Previously Presented) An admission controller for controlling admission of a new connection onto a transport link in a communication network, said admission controller comprising:

means for checking whether a multi-service traffic mix defined by previously admitted connections present on said link together with said new connection is contained within an intersection of multiple service-class-specific delay-limited admissible regions based on evaluation of the following inequalities:

$$\sum_{i=1}^{K} N_i \cdot TE_{ij} \le TN_{jj} + \text{constant}, \quad j = 1, 2, \ldots, K,$$

where K is the number of service classes in said traffic mix, TN_{ij} is a representation of the maximum number of connections from class-i assuming that a packet from class-j would fulfil a packet delay requirement of class-j, TE_{ij} is a service class equivalent measure representing how many new connections can be admitted from class-j in place of a connection from class-i considering only the packet delay requirement of class-j and N_i is the number of connections from class-i in the traffic mix; and

means for admitting said new connection for transport over said transport link only if said traffic mix is contained within said intersection of admissible regions.

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